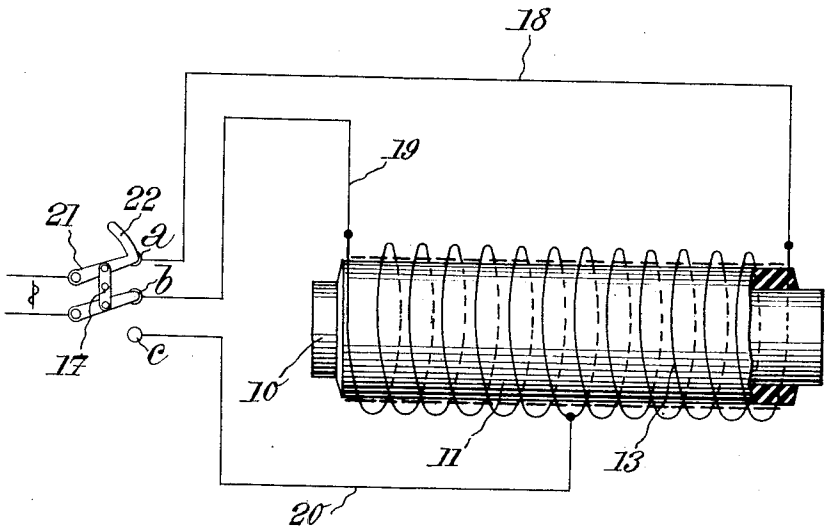
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DEVICE FOR THE VULCANIZATION OF RUBBER

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DEVICE FOR THE VULCANIZATION OF RUBBER

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3 Claims. (Cl. 219—19)

The present invention relates to devices for the thermic treatment of matters, in particular the vulcanization of rubber or the like, and it is especially concerned with devices for the thermic treatment of matter surrounding a mass of metal which include means for subjecting said mass, together with the matter that surrounds it, to the action of an alternating electromagnetic field which heats said metallic mass by an induction effect. This application is a continuation-in-part of our Patent No. 2,129,203, September 6, 1938.

In devices of this kind, the means for producing the electro-magnetic field consists of conductor elements located close to the outside of the system to be heated, said elements having an electrical resistance such that they can become heated by Joule effect as a consequence of the flow of the alternating current which serves to produce the electromagnetic field.

Now, in some cases, it may be advantageous or necessary to eliminate or stop the induction heating from the inside of the layer of matter surrounding the metallic mass, and thus to apply for some time only the Joule effect heating from the outside, in order to obtain a uniform and regular heating of the whole system. This is in particular the case whenever the amount of heating to be obtained by induction, from the inside of the mass is not to be very considerable, because, as a rule, the internal heating takes place under much more favorable conditions than the external heating as a consequence of the dispersion of heat in the surrounding air.

The object of the present invention is to provide devices of the kind above referred to which are adapted to meet the requirements above set forth.

An essential feature of the present invention, consists in providing, in such a device, windings which constitute both the means for producing the induction magnetic field and the means for giving off heat by the Joule effect, and in connecting these windings with the source of alternating current, preferably of high frequency, in such manner that, for an arrangement of the parts, the current can flow through said windings from one end thereof to the other end, thus producing both the internal and the external heating actions, whereas, for another arrangement of the parts, which can be controlled at will, both ends of the whole of the windings are connected to the same terminal of the source of current and the theoretical middle point of said windings is connected to the other terminal, whereby two magnetic fields are produced which destroy each other, and the internal heating by induction is eliminated.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawing, given merely by way of example, and in which:

The figure is a diagrammatic axial section of a first embodiment of the invention.

In the following description, it will be assumed that it is desired to subject to a thermic treatment the coating, made of a non-conducting material, such as rubber, paper, or the like, of a metallic piece, for instance cylindrical.

As shown by the figure, a metallic piece 10, such as a printing cylinder or roller, carrying a coating or layer of a matter, consisting for instance chiefly of rubber, 11, is placed axially in a simple or multiple coil or winding 13, formed for instance by at least one metallic band, such as a flat braid, which is given electric characteristics such that, under the influence of the current flowing therethrough, it can produce, by induction, the heating of the metallic core 10, and also constitutes a heating electric resistance which heats coating 11 from the outside.

Between the source of alternating current and winding 13, we provide a switch 17 the branches *a* and *b* of which can be connected respectively, through wires 18 and 19, with the ends of winding 13. With such a position of the switch, the heating conditions are those just above mentioned and we obtain the heating of coating 11 not only from the inside (by induction) but also simultaneously from the outside (by resistance, or Joule, effect).

The switch is provided with a third contact stud *c* connected through a wire 20 with the theoretical middle point of winding 13. Furthermore, one of the branches 21 of the movable part of the switch carries an extension 22 arranged in such manner that, when the other branch of said movable part of the switch is on contact *c*, said extension 22 short-circuits the two terminals *a* and *b* and thus connects both of the ends of winding 13 with the same terminal of the source of current. Therefore, when the switch is in this position, current keeps flowing simultaneously through the two halves of winding 13 and the heating from the outside (Joule effect) is maintained. But the heating from the inside (induction effect) is automati-

cally eliminated as a consequence of the fact that the two magnetic fields, produced respectively by the two halves of winding 13, have intensities which are equal but of opposite directions, so that they mutually compensate each other and their sum is equal to zero.

It is therefore possible, with such an arrangement, to stop at any time the internal heating and to maintain as long as it may be desired the external heating.

Of course, the thermic treatment, such as above disclosed, can be applied in a closed space, for instance in an autoclave, with the eventual application of a pressure or a suction.

Of course, although the invention has been described with reference to a specific example concerning the manufacture of printing cylinders or rollers, it is not limited to this application and can be used in all cases of heating by induction matters coating, covering or enveloping, either wholly or partly, a metallic piece capable of being heated, by induction, in an electro-magnetic field.

In a general manner, while we have, in the above description, disclosed what we deem to be a practical and efficient embodiment of the present invention, it should be well understood that we do not wish to be limited thereto as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What we claim is:

1. An apparatus for heating a non-conducting material surrounding a metal core comprising a winding of electrically conductive material about said material, means for applying an alternating current to said winding, said winding, on being energized by said current, being adapted to heat the inner surfaces of said material by heat inductively generated in said metal core and said winding being simultaneously adapted to heat the outer surfaces of said material by functioning as a heating resistance element, and means for shutting off the inductance heating of said winding while proceeding with the resistance heating function thereof.

2. An apparatus as in claim 1, said applying means comprising a source of alternating current connected to a switch, and first leads from the ends of said winding to said switch, said shutting off means comprising a second lead from the midpoint of said winding to said switch, and means constituted by said switch for short circuiting said first leads while establishing a circuit for said second lead.

3. An apparatus as in claim 1, said winding comprising a thin band-like piece of electrically conductive material.

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